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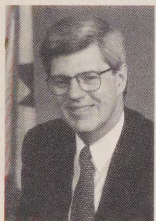


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Canada... hockey, right? Not exactly...

*What you don't know about
Canada's telecommunications
industry may surprise you.*

By the Honourable John Manley
Minister of Industry, Government of Canada



First elected in 1988 and re-elected in 1997 as Member of Parliament for Ottawa South, John Manley was appointed Minister of Industry in November 1993. In January 1996, he was given additional tasks as Minister responsible for the

Atlantic Canada Opportunities Agency, Canada Economic Development for Quebec Regions, and Western Economic Diversification Canada. Mr. Manley is assisted in these duties by three Secretaries of State.

The Minister is also responsible for a number of government agencies, including the Business Development Bank of Canada, the Canadian Space Agency, the Canadian Tourism Commission, the National Research Council of Canada, the Natural Sciences and Engineering Research Council of Canada, the Social Sciences and Humanities Research Council of Canada, the Standards Council of Canada and Statistics Canada.

WE ADMIT THE CONTRASTS ARE STARTLING:
Canada has a reputation as a polite, caring society — yet we produce the toughest hockey players in the world.

Canada is a place of vast distances and wide open spaces — yet we retain an intimate sense of community.

Canada is known for its great natural resources — yet we have been leaders in Information and Communications Technologies (ICT) since Alexander Graham Bell invented the telephone in Canada in

1874. We boast a sophisticated, technologically literate population, and offer ICT investment opportunities that are the envy of the business world.

The geographical realities of the second-largest country in the world have forced Canadians to rely on ICT to connect with each other. For many Canadians, information technology isn't just a convenience, it's a necessity. And if necessity is the mother of invention, Canadians have invented some of the world's most sophisticated telecommunications technology, from advanced fibre-optic networks to the V-chips mandatory in U.S. television sets.

Canada is one of the most wired — and wireless — countries in the world. Of all Canadian households, 99% have at least one telephone and 96% have access to cable television. Over 90% of Canadians live in areas serviced by two competing cellular networks.

CANADA COMPETES

- consistently rates as having the best quality of life in the world
- rates highest in the world for post-secondary enrolment
- leads G-8 economies in terms of growth
- has lower-cost after-tax R&D dollars than U.S., Japan, Germany.

Within the last two years, Canada has licensed four companies to deliver personal communications services (PCS) to Canadian consumers. Three local multipoint communications systems (LMCS) licences have also been issued.

In June 1997, 36% of Canadian homes had a computer, over half of them capable of hooking up to the Internet and its interactive window on the world. Canadian small and medium-sized businesses are rapidly increasing their Internet usage. It's estimated that by the end of 1997, some 40% of Canada's businesses will have connected to the Internet.

And as everyday Canadians have proven their willingness to embrace communications technology, so too has Canadian business proven its expertise in the same field.

Canada has the best communications infrastructure among the major industrialized countries. We are acknowledged leaders in terms of service, quality, market development and rates. Canadian communications equipment suppliers like Nortel and Newbridge

Networks work with other Canadian companies that are world leaders in telephone, fibre-optic and satellite network technology. The technical infrastructure is complemented by the services and software offered by Corel, Cognos, SHL Systemhouse and a dozen other Canadian technology innovators that enjoy strong international profiles.

A telecom revolution

In the last few years, a dramatic shift in Canada's regulatory framework has energized the domestic telecom environment, making it easier for Canadian companies to compete on the world stage.

A forward-looking telecommunications policy and arguably the best R&D incentives among the G-8 countries help Canadian companies develop the innovative new products and services that will drive tomorrow's Information Highway.

Foreign investors are attracted to Canada because of the country's proven expertise

in advanced information technologies, its superior transportation infrastructure — and because of the Government of Canada's open and competitive investment policies. Canada is a global crossroads, offering investors in Europe and Asia access to North America, which has the world's richest economy. In addition to having a growing domestic market, the North American Free Trade Agreement means Canada is an equal partner in a trading block of 386 million people, with a combined GDP of US\$8.5 trillion.

Access to the world

We live in a world where national prosperity is increasingly linked to the use of technology, particularly information technology. While Canada is already well-positioned for the emerging information age, the Canadian government recognizes the need to further promote and facilitate the use of innovative new technologies for all Canadians.

To that end, the federal government has initiated a policy of universal access to the Information Highway at a reasonable cost. Federal initiatives such as the Community Access Program, SchoolNet and the Student Connection Program make information technology available to Canadians in even the most remote areas of a vast country. "Universal access" extends to those with disabilities; the federal Assistive Devices Industry Office works with Canadian companies to develop affordable communications products and services for people who require alternative access methods. The goal of

CONSULTING CANADA

Canada has developed an international reputation in telecommunications policy and regulation. Each year, the Canadian Radio-television and Telecommunications Commission receives numerous foreign delegations looking for assistance on policy, market restructuring, privatization and competition. In addition, Canadian consulting services are widely used around the world.

- **McCarthy Tétrault** is advising the governments of Colombia, Jordan and Indonesia on development of competition in telecommunications markets.
- **Osler, Hoskin and Harcourt** has trained new regulatory agencies and staff in South Africa, Ghana, India and Latin America.
- **Teleconsult** — now merged with Deloitte & Touche Consulting Group — assists governments in developing nations to strengthen policy and regulatory functions.

universal access at a reasonable cost is to offer all Canadians more information, more services, more consumer choice — and the potential for unprecedented job creation and economic growth.

Canada's world-class infrastructure

A "world-class infrastructure." Easy enough to boast, difficult to back up.

But consider this scenario: if the rest of the world suddenly lost all of its telecom capability, Canadian companies could supply every single facet of a complete telecommunications infrastructure, from equipment design and manufacture, through advanced networking technology, to the software and services needed to run and maintain that infrastructure.

Networks

Canada has a history of firsts in telecommunications networking. Canadians built the first national commercial microwave network, the first digital microwave network, and the world's first coast-to-coast fibre-optic network.

Canada developed the first geostationary satellite telecommunications network, and has been at the leading edge of satellite communications ever since.

With the recent launch of the world's largest geostationary mobile communications satellite — MSAT — digital services are available in all parts of the country, from downtown Toronto to bush pilots in the Far North.

The National Test Network (NTN) is the longest fibre-optic network in the world, stretching 6,000 kilometres. Government, industry and educational institutions use the high-bandwidth NTN to test new and advanced Internet applications such as distance learning, telemedicine, virtual reality, and real-time audio and video feeds.

BAD, and other labs

The importance both industry and government place on the ICT sector is reflected in the number and quality of Canadian telecommunications research labs. The Communications Research Centre's BADLAB is a case in point.

BADLAB stands for Broadband Applications and Demonstration Laboratory. While its name is pure rock and roll, its mandate is all business: to make its facilities and personnel available to small and medium-sized high-tech companies developing innovative broadband products and services, and to test Information Highway applications using asynchronous transfer mode (ATM) technology. Canadian researchers are world leaders in ATM, which increases the capacity of the Internet and allows for faster, higher-quality communication.

EASY ACCESS

- The average price of 20 hours of Internet access among developed countries is C\$81.54, according to the Organization for Economic Cooperation and Development.
- The average Canadian spends just C\$28.36 for 20 hours of access time (versus C\$39.77 in the U.S.). This is the lowest cost in the world.

Other Canadian labs are heavily involved in telecommunications research and development. A few of them include:

- Ericsson Research Canada, based in Montréal;
- TRILabs, a consortium of industry, university and government in Western Canada;
- Centre de recherche informatique de Montréal; and
- Ontario's Centre of Excellence in Information Technology.

CANARIE

The name could almost take flight. **CANARIE** is the **Canadian Network for the Advancement of Research, Industry and Education**, a strategic partnership of over 140 private- and public-sector members. CANARIE:

- aims to establish an advanced network infrastructure for all Canadian communities
- stimulates development of new communications technologies and services
- facilitates Canada's transition to a knowledge-based society by linking sophisticated users on a high-quality, low-cost multimedia network.

While some Canadian companies are on the leading edge of telecommunications R&D, others supply the world with the advanced equipment needed to turn telecom dreams into reality.

Nortel is one of the world's most broadly diversified suppliers of telecommunications products, systems and networks. The company offers the equipment and services needed for a stunning variety of information, entertainment, education and business applications.

Newbridge Networks has developed a reputation for quality and is today the world's leading vendor of fully digital wide-area networks.

Bell Sygma Inc., a wholly owned subsidiary of Bell Canada, is one of the country's largest providers of end-to-end systems and network management services, and is the premier provider of telecommunications solutions worldwide.

NEWBRIDGE NETWORKS

- **Newbridge Networks** provides networking products and services to the world's 200 largest telecommunications service providers in more than 100 countries.
- **Newbridge** is a leading vendor of wide-area ATM, frame relay, T1/E1 and enterprise networks.
- **Newbridge** employs 6,000 people worldwide and more than 30% of its staff are devoted to R&D.

Other Canadian innovators include:

JDS Fitel Inc., which has achieved a leadership position in fibre-optic components and instrumentation; ISM-BC, which concentrates on multimedia and wireless communications; and Consultronics, which designs and manufactures test equipment for the telecom industries in over 60 countries.

Then there's Argus Technologies Limited's power supplies, TSB International's PBX, SR Telecom's wireless technology and literally hundreds of other Canadian telecom companies exporting equipment and services around the world. The Canadian ICT sector accounts for \$39.5 billion (in 1986 dollars) of Canada's GDP and as of 1996, employed over 417,975 people.

Content

A robust infrastructure is only part of the telecommunications picture. The technology of communications is important, but so is content — the software and services that light up the global network.

Corel has the world's best-selling graphics package with CorelDRAW, and is the world's second-largest developer of business software applications, led by its WordPerfect line. TimeStep Corporation, an affiliate of Newbridge Networks, makes security software that allows companies to use parts of the Internet for internal corporate purposes. Cognos designs world-class business software, Speedware Corporation sells analysis software, and SHL Systemhouse offers expertise in technology deployment.

NORTEL

Nortel offers one of the telecom industry's broadest portfolios of technology and network solutions, including:

- world-leading enterprise-network solutions
- comprehensive portfolio of turnkey wireless network solutions
- extensive portfolio of products and services for high-speed transport access
- 25% of 68,000 employees are in R&D.

The list is almost endless: Canada has roughly 15,000 software firms in operation, ranging from international giants to small, innovative businesses pushing the frontiers of technology.

Into the future

Right across Canada, the information society of tomorrow is taking shape today.

CTI, computer-telephony integration, has amazing potential for the future. Analysts estimate a global CTI market of C\$6.1 billion within three years, and many Canadian companies have already formed alliances to develop advanced CTI products and services. Mitel Corporation is working to deliver advanced, converged solutions with industry leaders such as Digital Equipment, Madge Networks, Intel and Microsoft. IML in Quebec is working with Melita International of Atlanta, Georgia, on ATM-connectivity solutions for the CTI market.

Business is not the only beneficiary of developing technologies. In Ontario, Nortel and the Canadian Imperial Bank of Commerce are testing the next generation of advanced electronic banking applications. The Universal Bidirectional Interactivity project in Quebec offers commercial data services through existing coaxial cable networks. The Remote Consultative Network in Alberta is experimenting with interactive medical consultation between rural health care providers and specialists in big-city hospitals. Intercom Ontario is testing interactive broadband technology in homes in the Newmarket, Ontario, area.

MITEL CORPORATION

- **Mitel Corporation** designs, manufactures and markets voice communications systems, public switching systems, network enhancement and gateway products, CTI systems and applications, client-server telecom products, mixed-signal CMOS integrated circuits, optoelectronic devices, and custom wafer products.
- **Mitel** pioneers CTI solutions that deliver network simplicity and improve productivity. Key technology areas include client-server telecom, voice LAN, USB, CTI applications, and real-time voice communications.
- **Mitel** has major international centres in Canada, the United States, Sweden, Wales, and Hong Kong, employing more than 4,000 people worldwide.

"The European lifestyle in most of Canada, the proven technical competence of my engineering staff, Canada's proximity to the U.S. markets, the low level of employee turnover . . . were all major factors which came together to make our sell to headquarters a successful endeavour."

Lionel Hurtubise, Chair, Ericsson Communications Canada

In fact, by the year 2005, 80% to 90% of all Canadians — spread across 10 million square kilometers — will have access to the broadband Internet that will be the backbone of the world economy of tomorrow.

Multimedia in Canada

Multimedia is getting a lot of attention these days — with good reason.

The future of communications will include a dazzling array of multimedia applications made available over a high-speed global network of interconnected wired, wireless and satellite technologies.

Canadian companies are taking advantage of the high quality of the Canadian telecommunications infrastructure to explore new realms of multimedia products, services, and commerce, in the process solidifying Canada's presence in the multimedia world.

The movies, and other diversions

While Canadian companies like Behaviour Communications Inc., Alliance Communications, and Mainframe Entertainment produce world-renowned animation and movies, other companies are star players in the industry's post-production edit suites and special effects houses.

From the special effects in *The Mask* and *Jurassic Park* to advanced editing software, Canadian companies have pioneered some of the most innovative techniques and technologies that drive the Hollywood dream factory. Industry experts estimate that 60% of the software used in Hollywood was developed in Canada.

But beyond the glitz of movie-making, Canadian firms have a strong presence in other areas of development, from

"Canada has a wonderful reputation as far as animation talent . . . there really has been over the years a lot of effort put into animation and [the] film industry in Canada."

Lenora Hume, VP, International Production, TV Animation, Walt Disney Inc.

CANADIAN CAPABILITY: IT'S A CINCH

- **CINCH** is the **Canadian Initiatives on Networking Clearing House**.
- **CINCH** is an on-line source of Canadian networking initiatives on the Information Highway.
- **CINCH** also acts as Canada's contribution to the Global Inventory Project, which is charged with creating a worldwide multimedia inventory of projects relating to the burgeoning information society.

educational, business, and information-based applications to the new technologies that will shape the multimedia of tomorrow.

Video to go

The "video telephone" has been a staple of pop fiction, from Dick Tracy's wristwatch TV to the casual "videocall" depicted in *2001: A Space Odyssey*. Video telephones have been technologically feasible for 50 years, but they were cumbersome and expensive and there was no practical way to offer their widespread use.

That was then, this is now.

Many experts believe that practical, low-cost desktop video conferencing, from multi-party business meetings to intimate one-on-ones, is part of the multimedia wave of the future. And typically, Canadian firms are riding the wave.

The CorelVIDEO system combines superior video conferencing software with low-cost hardware to deliver live, two-way interactive video communications. A Corel spinoff company, the Corel Computer Corporation, will market a video-enabled network computer, based on open Internet standards.

Saratoga Systems has developed Windows-based video/data conferencing software for its clients in broadcast media and advertising, while Visiocom builds video conferencing equipment and fully interactive multimedia service kiosks.

Starvision Multimedia Corporation, a Newbridge affiliate, is a world leader in distance education and telemedicine programs.

Advanced video applications are practical only with a robust telecom infrastructure. Video conferencing is already a fact in many business environments; falling prices combined with increased bandwidth will almost certainly make two-way video and data communications common in Canadian homes sooner than we expect.

Canada enjoys a healthy and vibrant multimedia community as a result of several factors, among them a sophisticated telecom infrastructure and the relatively free flow of information among the many research and development groups in the field.

A number of multimedia alliances are developing new links between technology and content, while at the same time working to improve the telecom infrastructure. The CESAM multimedia consortium brings

together groups from the telecommunications, audio-visual and mass media sectors to promote Canadian expertise in multimedia. New Media North is a partnership of creative service, content and technology providers working toward a global centre of multimedia excellence. IMAT is Canada's largest multimedia association; MEDIAfusion is a virtual corporation of communication and information technology professionals. For more background on Canada's multimedia industry, see: <http://strategis.ic.gc.ca/nme>

Tomorrow's innovators

Canada has the highest rate of post-secondary school enrolment in the world, and career opportunities are enormous for young people interested in the creation and dissemination of information — and information technology itself.

VIRTUALLY HOLLYWOOD

Canadian companies are helping Hollywood producers make movie magic.

- **SOFTIMAGE's** powerful software is used by developers on every games platform.
- **Discreet Logic's** software created special effects for movies such as *Apollo 13* and *Forrest Gump*.
- **Alias/Wavefront's** software created spectacular effects in movies such as *Crimson Tide* and *Jurassic Park*.
- Vancouver's **Vertigo Technology Inc.** develops 3D graphics software used by BBC, CNN, MTV, Time Warner and Walt Disney Studios.

Sixty-seven universities and colleges produce more than 25,000 graduates per year in computer science, mechanical engineering and other pure and applied sciences. There are also a dozen advanced educational centres that feed the world multimedia market, among them Sheridan College, The Banff Centre for the Arts and the Emily Carr Institute of Art and Design. The creative talents nurtured in these innovative programs are recruited by Canadian companies and such entertainment giants as Walt Disney Animation, Fox Animation Studios, Dream Works and Industrial Light and Magic.

A telecom model

As the geographical realities of distance have shaped Canada economically, politically and socially, so have they shaped our telecom industry. Canadians have become world leaders in ICT by necessity, in part to overcome the great distances that separate so many of us.

Telecommunication is all about collapsing distances and conveying a maximum of information in as transparent a way as possible. As the information age becomes reality, Canadian telecom innovation and expertise will allow "information entrepreneurs" and multimedia developers all over the world to let their imaginations soar, unencumbered by the restrictions of technology.

Three factors shape the Canadian telecommunications model: a bold, forward-looking policy environment; a series of strategic partnerships involving industry, government and educational institutions; and a competitive drive that keeps Canadian companies on the leading edge of telecom development.

The result: a textbook example of how to create one of the most advanced information infrastructures in the world.

CORPORATE BITS ...

- **Centrepont Technologies** is a leading developer of CTI solutions for the burgeoning small office/home office (SOHO) market. Its "Concerto" phone system for the micro-business has been touted by *PC Magazine* as "the latest star on the telecommunications scene ... a robust product full of desirable features" (June 1997).

Centrepont has also recently signed three major second-tier channel partner contracts to launch the Concerto into North America-wide distribution.

- **Research In Motion (RIM)** is a leading developer, manufacturer, and worldwide marketer of low-power portable modem technology for the narrow-band PCS wireless data industry. In March 1997, **RIM** won the I-Wire design award for the world's first two-way pager.

- **MicroLegend Telecom Systems** develops solutions based on the SS7/C7 protocol. Recently, Teleglobe Canada announced the availability of GSM roaming between North America and Europe using **MicroLegend** technology.

Interested in being our next partner?

We would be glad to provide you with more information about Canada, our dynamic Information and Communications Technologies sector, or about specific companies mentioned. You can E-mail or call us at:

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Spectrum, Information Technologies
and Telecommunications

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Fax: (613) 990-4215

E-mail: paul.charmaine@ic.gc.ca

You may also contact the nearest Canadian Embassy or Consulate for more information. The directory of the Trade Commissioner Service abroad can be obtained at: <http://www.infoexport.gc.ca/section3/directory-e.asp>

For information on the companies and organizations mentioned in this article, contact:

Alias/Wavefront

<http://www.aw.sgi.com>

Alliance Communications

<http://www.alliance.ca>

Argus Technologies Limited

<http://www.argus.ca>

Banff Centre for the Arts

<http://www.banffcentre.ab.ca/CFAindex.html>

Behaviour Entertainment Inc.

<http://www.behaviour.com>

Bell Sygma Inc.

<http://www.bellsygma.com>

Canadian Imperial Bank of Commerce

<http://www.cibc.com>

CANARIE

<http://www.canarie.ca>

Centre de recherche informatique
de Montréal

<http://www.crim.ca>

Centrepoint Technologies

<http://www.ctrpoint.com>

CESAM

<http://www.cesam.qc.ca>

CINCH

<http://strategis.ic.gc.ca/cinch>

Cognos

<http://www.cognos.com>

Communications Research Centre

<http://www.crc.doc.ca>

Community Access Program

<http://cap.unb.ca>

Consultronics

<http://www.consultronics.com>

Corel

<http://www.corel.com>

CrossKeys Systems Corporation

<http://www.crosskeys.com>

Digital Equipment Corporation

<http://www.digital.com>

Discreet Logic

<http://www.discreet.com>

Eicon Technology Corporation

<http://www.eicon.com>

Emily Carr Institute of Art and Design

<http://www.eciad.bc.ca>

Ericsson Communications Canada

<http://www.ericsson.com/CA>

IMAT

<http://www.imat.ca>

IML

<http://www.iml-cti.com>

Intel

<http://www.intel.com>

Intercom Ontario

<http://www.intercom.yorku.ca>

ISM-BC

<http://www.ismbc.com>

... AND BYTES

- **Vienna Systems** provides server hardware and software products for delivering voice, data and video across business intranets and the public Internet. **Vienna** products also act as a gateway between computer networks and the public telephone network.
- **Eicon Technology Corporation** develops hardware and software that allows desktop PCs to access LANs and other on-line business services, and the Internet. **Eicon** is a world leader in access cards, ISDN PC cards, gateways and emulation software.
- **CrossKeys Systems Corporation** provides advanced integrated systems management to customers in more than 40 countries. **CrossKeys'** multi-platform software has already established the company as a global player after only five years in existence.
- **Platform Computing Corporation** has won rave reviews for their LSF (Load Sharing Facility), a suite of system software that turns a computer network into a "virtual supercomputer" to dramatically improve user productivity.

JDS Fitel Inc.

<http://www.jdsfitel.com>

Madge Networks

<http://www.madge.com>

Mainframe Entertainment

<http://www.mainframe.bc.ca>

McCarthy Tétrault

<http://www.mccarthy.ca>

MEDIAfusion

<http://www.mfusion.com>

Melita International

<http://www.melita.com>

MicroLegend Telecom Systems

<http://www.microlegend.com>

Microsoft

<http://www.microsoft.com>

Mitel Corporation

<http://www.mitel.com>

Newbridge Networks

<http://www.newbridge.com>

New Media North

<http://www.ocri.ca/nmn/abnmn1.html>

Nortel

<http://www.nortel.com>

Osler, Hoskin and Harcourt

<http://www.osler.com>

Platform Computing Corporation

<http://www.platform.com>

Remote Consultative Network

<http://wnet-web.culturenet.ca/wnet/projects/1004.html>

Research In Motion

<http://www.rim.net>

Saratoga Systems

<http://www.saratoga.com>

SchoolNet

<http://www.schoolnet.ca>

Sheridan College

<http://www.sheridanc.on.ca>

SHL Systemhouse

<http://www.shl.com/index.html>

SOFTIMAGE

<http://www.softimage.com>

Speedware Corporation

<http://www.speedware.com>

SR Telecom

<http://www.srtelecom.com>

Starvision Multimedia Corporation

<http://www.starvision.com>

Strategis

<http://strategis.ic.gc.ca>

Student Connection Program

<http://www.scp-ebb.com>

Teleconsult

<http://www.teleconsult.com>

Teleglobe Canada

<http://www.teleglobe.ca>

TimeStep Corporation

<http://www.timestep.com>

TRLabs

<http://www.edm.trlabs.ca>

TSB International

<http://www.tsb.ca>

Vertigo Technology Inc.

<http://www.vertigo3d.com>

Vienna Systems

<http://www.viennasys.com>